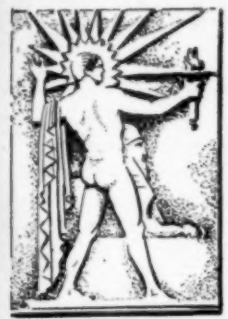


PHOTOGRAPHIC
LIBRARY
UNIV. OF MICH.

APR 23 1928



SCIENCE NEWS-LETTER

The Weekly Summary of Current Science
A SCIENCE SERVICE PUBLICATION



\$5 a year 15c a copy



April 21, 1928



DOGWOOD TIME

(See page 242)

Vol. XIII

No. 367

free,
vance
erva-

ff of
ntin-
re-
than
on.
Los
urist
re a
Mt.
Ob-
Cali-
econd
lens
great
the
n the
Lick,
pier
p of
unity,
year

a the
of the
with
n an-
ealed
other
itions
these
which
ained

pro-
ntain,
w the
hoto-
m. to
night
rough
e at
sually
also

acific
orld's
the
This
Do-
atory.
d of
great
a and
is in-
ction
uring
close
spec-
the
al as

Dextrose Candy Aids Reducing

Physiology

Small doses of dextrose candy taken between meals have helped a group of nurses at Jefferson Hospital of Philadelphia to remove surplus pounds of too, too solid flesh.

The experimental work leading to these much-desired results was undertaken under the direction of Dr. Burgess Gordon and E. von Stanley.

In studying the question of obesity, Dr. Gordon operated on the hypothesis that the craving of fat persons for sugar may be a symptom of sugar deficiency. In such people it may be that the fat-forming food may be misdirected to channels from which energy is not already derived.

Consequently he decided to find out if weight would be lost when the class of foods comprising the

sugars and starches were supplied in very readily available form, during actual exercise, so that its immediate utilization would permit only a minimum storage of fat.

A group of overweight nurses were accordingly selected for subjects and examined to rule out those with glandular disturbances or other physical drawbacks that might be aggravated by the diet tests. The diets, covering from 1,800 to 3,000 calories a day, were then arranged so that fat and protein were taken at meal times, while carbohydrate was taken between meals in the readily digested form of dextrose candy.

"The total intake of candy was between 3.5 to 6.2 ounces," Dr. Gordon explained. "The patients were

advised to walk twelve blocks both in the morning and afternoon, and to consume the largest portion of candy during exercise. A fairly constant loss of weight occurred in six individuals during a period of three weeks. The greatest loss was 23 pounds."

Six of the eleven nurses who stayed in the test lost an average of three pounds a week and suffered practically no discomfort from the regime. Among those who did not lose, two took insufficient exercise, one was unable to follow the diet satisfactorily, while the question of endocrine disfunction was raised in the remaining two.

Science News-Letter, April 21, 1928

Dogwood Time

Botany

Now is the time for wood-wandering, throughout a wide stretch of America, from Massachusetts to Ontario, southward to the Gulf and westward through Texas into eastern Mexico. For now is the time of the flowering dogwood. It began a couple of weeks ago in the southern part of its range, but is just coming on in the North.

The flowering dogwood stands high among the aristocracy of our native flowering trees and shrubs. There is a peculiar pearly luster on its petal-like bracts that is hardly matched by any other white flowers, unless it be among the lily family. The flowering dogwood is not alone among the dogwoods in having these petaloid members; the familiar bunchberry is another example, but the flowering dogwood has been the most successful in carrying out the scheme on a grand scale, assuming small-tree proportions and covering a very considerable portion of a continent.

Its success, however, has brought penalties and hazards in its train. Automobiles loaded with looted woodland pearl are still all too familiar a sight in many parts of the country, though it is coming to be recognized as bad form to break down dogwoods. Perhaps we can reform ourselves before the species has been entirely wiped out.

Science News-Letter, April 21, 1928

In This Issue—

Robbers of pearls, p. 242—How miners wrote, p. 243—Copper Livers, p. 245—Identifying champions, p. 246—The first globe-trotter, p. 247—Last of the Catawbas, p. 249—Skeletons and knowledge, p. 250—Big and little animals, p. 251—It isn't in rice, p. 252—Modern Jove, p. 253—Ireland's lack, p. 253—Snapshots, p. 255—Zoo inmates, p. 255.



SCIENCE NEWS-LETTER, The Weekly Summary of Current Science. Published by Science Service, Inc., the Institution for the Popularization of Science organized under the auspices of the National Academy of Sciences, the National Research Council and the American Association for the Advancement of Science.

Edited by Watson Davis.

Publication Office, 1918 Harford Ave., Baltimore, Md. Editorial and Executive Office, 21st and B Sts., N. W., Washington, D. C. Address all communications to Washington, D. C. Cable address: Scienserve, Washington.

Entered as second class matter October 1, 1926, at the postoffice at Baltimore, Md., under the act of March 3, 1879. Established in mimeographed form March 13, 1922. Title registered as trade-mark, U. S. Patent Office.

Subscription rate—\$5.00 a year postpaid. 15 cents a copy. Ten or more copies to same address, 5 cents a copy. Special reduced subscription rates are available to members of the American Association for the Advancement of Science.

Advertising rates furnished on application.

Copyright 1928, by Science Service, Inc. Reproduction of any portion of the SCIENCE NEWS-LETTER is strictly prohibited since it is distributed for personal, school, club or library use only. Newspapers, magazines and other publications are invited to avail themselves of the numerous syndicate services issued by Science Service, details and samples of which will be gladly sent on request.

INTERPRETING week by week, the latest developments in the various fields of science, this magazine attempts also to present its articles in the most pleasing and readable topography and the most convenient arrangement.

The clippability, indexing, and automatic dating of each article are unique features.

This is a separable magazine. Each original article can be clipped or torn out without losing or damaging another important article on the other side. These original articles are backed by reprinted quotations or excerpts, short one-sentence items, advertisements, and other material not likely to be clipped and preserved.

Each article is automatically indexed by the key word printed in italics just below the heading, or at the end of the article when the article has no heading. Articles can thus be filed easily into any system of classification, whether it be Library of Congress, Dewey, or one of the reader's own devising.

Each article is automatically dated by its last line.

All of the resources of Science Service, with its staff of scientific writers and correspondents in centers of research throughout the world, are utilized in the editing of this magazine.

An extra supply of this issue and last week's European Travel Number of the Science News-Letter are provided so that you can send copies to your friends who are planning vacation trips. Send 30 cents (in stamps if you wish) and a memorandum of name and address.

Making of Alphabet Traced to Sinai

Archæology

BY EMILY C. DAVIS

The wilderness of Sinai, one of the most desolate corners of the earth, must have been the scene of two of the world's greatest discoveries—the use of metals and the alphabet.

This, at least, is the belief of scientists who have been studying the evidence preserved near the copper and turquoise mines of the barren Sinai peninsula.

Sinai was pointed out as the most probable region where man first learned to use metals by Dr. Henry Breasted, noted Egyptologist and director of the Oriental Institute. Wealth of copper and turquoise hidden in its maze of rocks is the redeeming feature of the wilderness. But in the prehistoric Stone Age, men and women saw the glint of copper veins in the rock and went right on blindly making crude stone tools and weapons. Finally, about 4000 B. C., it is believed, an Egyptian wanderer in Sinai banked his campfire with pieces of copper ore lying on the ground, and next morning was pleased to see glittering beads of metal in the ashes. In time, he or his fellows learned to turn the magic trick at will. The shining metal was good for bead necklaces. It was good for making sharp blades. And so man entered into the Age of Copper.

Now, the alphabet's origin is also being linked with Sinai's mines—its turquoise mines, in this case. For years, scholars of languages have tried to trace back to its first chapter the story of how man learned to make his letters. They have shown that our alphabet traces its ancestry back to the alphabet invented by the Phoenicians, a practical people who believed they could simplify the difficult picture and sign writing of the Egyptians and Babylonians. But why, and when, and how the Phoenicians took the important step has been one of the great unsolved scientific mysteries.

It was more than twenty years ago that a British expedition in Sinai first discovered there some stone tablets carved with inscriptions in a strange alphabetic writing. Most of the evidence could not be moved back then to civilization, so the scientists made the best copies and photographs of the inscriptions that they could in the time they had and returned to tell about their important find.

And ever since, the Sinai inscrip-



HATHOR, the popular Egyptian Cow-Goddess, whom the Sinai miners adopted as one of their own deities

tions have been a big question mark. Were they the missing link in the evolution of the alphabet? Were they the exhibits of man's first attempts to use the great literary invention? Last spring, a Harvard-Michigan expedition, led by Prof. Kirsopp Lake, journeyed to Sinai in search of old manuscripts and stopped at the turquoise mines on their return. They discovered there three new inscriptions in the strange writing, and with much trouble loaded seven of the tablets on camels and brought them down to Egypt. At Cairo, the inscriptions were examined by Prof. Romain Butin, an American archaeologist of the Catholic University, who at once set upon the

task of translating the set of writings, and now finally his interpretation has been reported to the Harvard Theological Review.

These inscriptions on tablets of stone are the oldest known alphabetic writing of the Phoenicians, Prof. Butin concludes. He estimates that they were made about 1900 B. C., several centuries before Moses or Tutankhamon—back in the days of a pharaoh who was one of the pyramid builders, Amenemhat III. But, old as the writings are, and they are several hundred years older than the alphabet has ordinarily been supposed to exist, they are not the very first samples of the famous Phoenician alphabet, he says, for they must have been preceded by some more primitive, more picture-like signs.

But if man's first attempts at his letters have not been discovered, from the clues now available it is possible to reconstruct the manner in which the alphabet was devised.

From early days of Egypt, the pharaohs knew of the treasures buried in the Sinai wilderness, and sent expeditions across the Red Sea to mine for precious stones and copper. Many of the miners of about Amenemhat's time were Semites from Phoenicia and Syria. Whether or not they were of the Hebrew branch of the Semitic race and whether they had any connection with the Hebrew tribes of the Bible had not been determined. They were not the oppressed slaves of later pharaohs at any rate, because it is known that they came willingly to Egypt in large numbers, and there is evidence that they were fairly treated.

The Semitic miners of Sinai took rounded stones to make rock huts for themselves. They found near the mines a rock shrine to the Egyptian Cow Goddess Hathor, Lady of Turquoise, and the miners, eager for the favors of the goddess who brought success in the quest for the blue stones, worshipped her with Semitic rites. They used the old, old method of setting up tablets as permanent reminders to the goddess of their petitions. And it is some of these stone carvings that Prof. Butin has pronounced the oldest known writings in the Phoenician alphabet.

Now, the Phoenician workmen might have been content to let the Egyptians carve out their sentiments in the difficult Egyptian hier- (Turn the page)

Making of Alphabet Traced—Continued

oglyphics. But perhaps they wanted to be able to read the tablets of petition and to assure themselves that their petitions to Hathor were just as they wanted them. They probably felt, too, that the Phoenician tongue, which they used, was more appropriate in approaching a Semitic deity.

Whatever the outstanding reason was, Prof. Butin concludes that some of the Semitic leaders, perhaps with the aid of an Egyptian, worked out for the miners a set of symbols with which prayers to Hathor and records

of important events could be more simply written. The working models for the alphabet were the great array of pictures of the Egyptian hieroglyphics in the region. The ox-head sign became one letter, later on our letter A. The Egyptian box-like picture of a house became the forerunner of our letter B, and so on. So, mostly from the Egyptian monuments, they selected enough signs to represent the different consonant sounds in their own Phoenician language.

It seems fairly certain that the alphabet was made in this lonely place from Egyptian inscriptions nearby, because the alphabet signs that appear here are so much more like the Egyptian picture writing of Sinai than like the picture writing of Egypt. The pharaohs did not send their best craftsmen out to the wilderness. Even the crudities of the Egyptian workmanship are reproduced by the inventors who were trying to simplify the business of writing.

"Some people find it hard to believe that such an epoch-making invention as the Phoenician alphabet could have come out of this unlearned mining colony," said Prof. Butin. "It is popularly supposed that the benefactor who made this great contribution to civilization must have been some learned Phoenician aiming to promote scholarship.

"But the opposite is more likely to be the truth. Highly educated people, familiar with the complex methods of writing used in ancient times, would have scorned a simple method, considering it useful to the ignorant but not worthy of their attainments. The Egyptians themselves had an alphabet system, but they never used it exclusively and clung to their old system of writing partly in pictures and partly in alphabetic signs. Even when the fame of the Phoenician alphabet spread to Egypt, they clung to their old complex system, the badge of intellectual superiority. So, it seems that the forerunner of the modern alphabet must have been invented for everyday people, who could not learn anything more difficult."

The Semitic miners used their alphabet chiefly for religious purposes, but they also recorded events on the tablets, and in at least one case it served to record for them an eventful time when they displayed bravery in action.

An inscription recently discovered, cut in the wall of one of the turquoise mines, is interpreted by Prof. Butin: "The gang, consisting of nine men, successfully protected the baskets (of turquoise) for the superior officer (whereupon) Ram and his people made a great celebration."

Explaining his translation of this dramatic bit of history, Prof. Butin says:

"There seems to be an allusion to a raiding party which attacked the convoy carrying the baskets of turquoise to the officer, or (Turn to page 249)

SINAI	PHOENICIAN	EARLY GREEK	LATIN	ENGLISH
𐤀 𐤁 𐤂	𐤀	Α Α	A	A
𐤃 𐤄 𐤅 𐤆 𐤇	𐤃	Β Β	B	B
𐤈 𐤉 𐤊 𐤋	𐤈	Γ Γ	CG	CG
𐤌	𐤌	Δ Δ	D	D
𐤍 𐤎 𐤏	𐤍	Ε Ε	E	E
𐤐 𐤑 𐤒 𐤓	𐤐	Ϝ ϝ	FV	FVU
𐤔 = 𐤕 = 𐤖	𐤔	Ι	...	Z
𐤗 𐤘	𐤗	Η Η	H	E H
𐤙 𐤚 𐤛	𐤙	Θ Θ	...	TH.PH
𐤜 (𐤝)	𐤜	Ζ Ζ	I	I
𐤞 (𐤟)	𐤞	𐤠	...	K.KH
𐤡 𐤢 𐤣 𐤤 𐤥	𐤡	Λ Λ	L	L
𐤦 𐤧	𐤦	Μ Μ	M	M
𐤨 𐤩 𐤪 𐤫	𐤨	Ν Ν	N	N
𐤬 𐤭 𐤮 𐤯	𐤬	Ξ Ξ	X	X
𐤰 𐤱 𐤲 𐤳	𐤰	Ο Ο	O	O
𐤴	𐤴	Π Π	P	P
𐤶 𐤷 𐤸	𐤶	Μ Η	...	S
𐤹	𐤹	Ϟ ϟ Ϡ	Q	Q
𐤺 𐤻 𐤼	𐤺	Ρ	R	R
𐤽 𐤾 𐤿	𐤽	Σ	S	S
𐥀 𐥁	𐥀	Τ Τ	T	T

STEPS IN THE EVOLUTION of our modern ABC's. Ten additional signs have been found on some of the stone writings in Sinai, making 32 letters in that ancient alphabet

Copper, Fits, Legs, Yeast, Brains

General Science

Following are reports by Watson Davis of some of the more important papers presented at the meeting of the Federation of American Societies for Experimental Biology, Ann Arbor, Mich., April 12 to 14.

Copper, the red metal, is an essential factor in the diet to keep the blood red and the body vigorous, a group of University of Wisconsin chemists headed by Dr. E. B. Hart announce.

Copper may become acknowledged as one of the more essential requisites in human nutrition and livestock feeding. The Wisconsin experiments indicate that it exerts a tremendous influence on anemia in rats, a disease similar to anemia in children who have been fed exclusively on milk. The malady in both rat and child is caused by a deficiency of hemoglobin in the blood stream.

A shortage of iron has been credited with being responsible for the disorder, and although iron compounds are still limiting factors, their effectiveness, according to Wisconsin investigators, depends on the presence or absence of copper. The investigations covered four years, and Dr. Hart was assisted by his colleagues, Drs. H. Steenbock, C. A. Elvehjem, and J. Waddell.

Because milk is notoriously low in iron and hemoglobin is rich in the mineral, it has always been assumed that the way to correct anemia was to add iron to the milk diet.

In the case of animals this plan



COPPER MADE THE DIFFERENCE. On a diet consisting of whole milk, pure iron and liver, the rat on the right recovered completely from a severe attack of anemia, while his litter mate, at the left, was fed the same diet, but without the liver. The liver is rich in copper.

proved ineffective. The daily feeding of iron, administered as chloride, sulfate, acetate, citrate, or phosphate, all prepared from pure iron wire, did not check the decline in the hemoglobin content of the blood. Rats suffering with anemia were not improved.

However, when a supply of iron was obtained by feeding dried liver, or the ash of dried liver, corn, or lettuce, the hemoglobin was raised to normal and the stricken rats immediately restored to health. In ashing the foodstuffs, the investigators noted a pale, bluish color, the typical hue produced when copper compounds are burned. Observation of this peculiar color, in addition to the fact that copper is known to be present in the respiratory pigment, hemocyanin, of certain crustacea, led the chemists to use copper sulfate as a supplement to pure ferric chloride in the whole milk diet.

Striking cures resulted. Rats, so anemic that their days appeared to be numbered, recovered immediately and the hemoglobin in their blood was brought to normal.

Human Possibilities

"What about pernicious anemia in man?" the chemists asked. Patients suffering with anemia have been told to eat liver, advice which has evidently made a wide impression, judging from the rise in price of what was once poor man's meat. However, some sufferers find liver unpalatable, especially when eaten in large quantities. Harvard university scientists have prepared a liver extract which has proved exceedingly efficacious in abating the disease. In the Wisconsin experiments, this product was ashed and fed the anemic rats. When fortified with ferric chloride, it also proved effective in correcting the ailment. Thus this product which has been most successful in treating man corrected the deficiency in rats.

Copper's role in plant and animal tissues is not clearly understood. It is found in milk, in small quantities. Its function in producing hemoglobin is, Dr. Hart stated, idle to speculate. Hemoglobin may not contain copper, at least no evidence to the contrary has yet been produced. In this connection, copper may act as a catalyst, an agent which starts an action without being changed itself. It may promote the building of hemoglobin. Iron functions in a similar manner in the production of chlorophyll, the green pigment of vegetation, although it is not a constituent of the chlorophyll molecule.

Experiments with the use of copper in the diets of anemia patients will be undertaken in the near future at certain leading hospitals. If this inorganic substance plays the part in the human system that it does in the life of white rats, nutrition specialists will probably give as much consideration to the copper content of foodstuffs as is now paid to some other elements, such as phosphorus, calcium and iodine. Future experiments at Wisconsin will also approach the problem from this standpoint, as the copper content of animal feeds is known to vary widely.

Tests Pick Athletes

Picking the varsity athletic squads by scientific tests conducted with impartial unemotional instruments registering to the thousandth of a second will soon be common practice in American universities if the possibilities of experiments of Prof. Walter R. Miles of Stanford University reported to the medical meetings here are appreciated by the coaches and the athletics-enthusiastic alumni.

Prof. Miles disclosed how he took a chronometer of special design upon the football practice field last fall and picked out the one man of the squad who because of his (Turn the page)



DR. E. B. HART, head of the Department of Agricultural Chemistry at the University of Wisconsin, whose researches show the value of copper in the treatment of anemia

Societies for Experimental Biology—Continued

slowness of charging had already been selected independently by the coach for replacement. Prof. Miles' test took twenty minutes while the coach declared his decision was reached only after two years of observation of the squad. The football squad lined up as if for an actual scrimmage. The head of each man pressed against a trigger which when he plunged forward dropped a golf ball on a rapidly revolving paper covered screen drum thus recording accurately the lag of each man in getting into action. Men of varsity ability charged in less than four hundred thousands of a second after the signals were given. It was predicted here this morning that the same methods can be applied with advantage to other sports.

Huckleberries for Diabetes

The search for a diabetes remedy that can be taken through the mouth is being undertaken by many of the investigators who talked before the Federation of American Societies for Experimental Biology. Hundreds of thousands of diabetics are being kept alive by insulin, an extract of the pancreatic gland which was isolated a few years ago at the University of Toronto. Insulin must be administered by daily hypodermic injections and the diabetic sufferers would rejoice if they could take their medicine as a powder or a pill. Four such preparations were discussed. One of them, called myrtillin, made from huckleberry leaves was described by its discoverer, Dr. Richard C. Wagoner of Allentown, N. J. His attention was directed to this source when studying at Vienna by a professor who said: "I wish you would get me some huckleberry leaves. I have a mild case of diabetes and my old aunt says huckleberry tea will cure it. This is nonsense, of course, but my aunt would give me no peace till I try it." So Dr. Wagoner got the leaves and found it did reduce blood sugar. During the last three years Dr. Wagoner has found the same substance in the green leaves of many plants. Diabetics who would have needed a high insulin dosage before starting on myrtillin are able to go now without insulin and show normal blood sugar. Myrtillin will act even in a test tube outside the living body. Dr. J. A. Morrel of Toronto experimenting with a similar huckleberry leaf preparation "myrtomel" also finds that it reduces materially the amount of insulin required.

On the other hand, Dr. W. G. Karr of the University of Pennsylvania gets better results in diabetes from

synthalin, a German coal-tar preparation. Another German medicine for the same purpose, glukhorment, is, according to Dr. Fritz Bishoff of Santa Barbara, identical in composition with synthalin.

Dyes for Disease

A new method of fighting disease by injecting brilliantly colored dye into the toxin ridden body was announced to the scientific world by Profs. P. J. Hanzlik and E. M. Butt of Leland Stanford University, Calif.

Botulism food poisoning, difficult at present to combat, diphtheria, cobra venom, strychnine and other toxic agents were protected against when the California scientists injected a dye, known as congo red, into the muscles of guinea pigs, rabbits and pigeons. Most promising results were obtained with botulism and diphtheria in which cases eight out of ten of the infected animals were cured whereas without treatment all would have died.

A new principle in disease treatment by chemotherapeutic methods was disclosed by these experiments. When more fully developed in the laboratory and then applied to man, this research may further tighten man's defenses against the germ world. Other dyes were found partially effective in offsetting poisons and the toxic substances that harmful organisms produce in the body. Prof. Hanzlik attributed the beneficial properties of the dyes to the fact that they have the power of absorbing the toxins or poisons and preventing them from damaging the cells and tissues of the body. Only those dyes that are very finely divided and colloidal in nature are effective.

With this new dye treatment of disease there comes the possibility that one remedy can be devised that is effective against a number of diseases. Heretofore the physician has not been able to aim at more than one disease at a time with the same ammunition. Diphtheria must be subdued with an anti-toxin especially made for that disease alone. But congo red has been found by Prof. Hanzlik to be effective against diphtheria and a number of other poisonings of the animal machine. It is non-specific. It may be a step toward the day when several diseases can be treated out of the same bottle in the drug store.

The Puzzle of "Fits"

A step toward an understanding of the nature of epilepsy, one of the most baffling of all human ills, was reported by Dr. Lawrence O. Mor-

gan, of the University of Illinois College of Medicine. By surgical procedure, Dr. Morgan produced lesions in certain parts of the cerebrum, or forebrain, in dogs. The animals recovered from the operation, and their conduct most of the time was normal. But periodically they went into fits, which in all essential respects were identical with those characterizing human epilepsy. An examination of the brains of four human beings who in life had been subject to epileptic seizures showed abnormalities of the region of the brain corresponding to the areas where the artificial injuries had been produced in the dogs.

Changing Legs

Transplanting legs and hearts from one animal to a distantly related species was the feat reported before the anatomists by Dr. W. M. Copenhaver, of the University of Rochester. The animals involved were two rather remote relatives of frogs and toads, more nearly akin to salamanders. One was the Mexican axolotl, the other a European creature called the triton. They are rated as rather distant zoological cousins. At an early stage in their existence the beginnings of legs were removed from the axolotls and planted on the tritons in place of their own limbs. They were a little slow in taking hold, but after they did they made up for lost time, becoming larger than the tritons' own legs which had been left in place on the opposite sides of their bodies.

Dr. Copenhaver also grafted axolotl hearts into triton bodies. Here also the transplanted hearts grew bigger than the normal hearts of unoperated tritons of the same size. Moreover, they did not seem to become wholly "naturalized" in their new homes, for their pulse persisted at something like that of the normal rate for the axolotls from which they came.

The brain of the tiny hummingbird is more primitive and lizard-like than those of most of its feathered kindred, and resembles in many of the details of its structure the brain of the great dragon lizard of the East Indies, *Varanus komodensis*, which created a sensation when brought to this country a short time ago. So declared Dr. E. Horne Craigie of the University of Toronto. There are also certain similarities in structure between the hummingbird's brain and the brain of the parrot.

CLASSICS OF SCIENCE:

Tales of Marco Polo

Exploration

Long abused as an extravagant liar, Marco Polo has only recently received his due place as a sober recounter of adventures in alien lands. The great sheep described in the first story was named for the explorer, who, so far as European records go, was the first to discover the species.

THE BOOK OF SER MARCO POLO, the Venetian, Concerning the Kingdoms and Marvels of the East, Translated and edited, with notes, by Colonel Sir Henry Yule, R.E., C.B., K.C.S.I., Corr. Inst., France. Third Edition, revised throughout in the light of recent discoveries by Henri Cordier (of Paris), in two volumes. London, 1903.

Prologue

Great princes, emperors and kings, dukes and marquises, counts, knights and burgesses! and people of all degrees who desire to get knowledge of the various races of mankind and of the diversities of the sundry regions of the World, take this Book and cause it to be read to you. For ye shall find therein all kinds of wonderful things, and the divers histories of the Great Hermania, and of Persia, and of the Land of the Tartars, and of India, and of many another country of which our book doth speak, particularly and in regular succession, according to the description of Messer Marco Polo, a wise and noble citizen of Venice, as he saw them with his own eyes. Some things indeed there be therein which he beheld not; but these he heard from men of credit and veracity. And we shall set down things seen as seen, and things heard as heard only, so that no jot of falsehood may mar the truth of our Book, and that all who shall read it or hear it read may put full faith in the truth of all its contents.

For, let me tell you, that since our Lord God did mould with his hands our first Father Adam, even until this day, never hath there been Christian, or Pagan, or Tartar, or Indian, or any man of any nation, who, in his own person, hath had so much knowledge and experience of the divers parts of the World and its wonders as hath this Messer Marco! And, for that reason, he be-thought himself that it would be a very great pity did he not cause to be put in writing all the great marvels that he had seen, or on sure information heard of, so that other people who had not these advantages might, by his Book, get such knowledge. And I may tell you that in acquiring this knowledge he spent



OVIS POLI

in those various parts of the World good six-and-twenty years. Now, being thereafter an inmate of the prison at Genoa, he caused Messer Rusticiano of Pisa, who was in the said prison likewise, to reduce the whole to writing; and this befell in the year 1298 from the birth of Jesus.

The Great Sheep—Ovis Poli

In leaving Bedashan you ride twelve days between east and north-east, ascending a river that runs through land belonging to a brother of the Prince of Badashan, and containing a good many towns and villages and scattered habitations. The people are Mahommetans, and valiant in war. At the end of those twelve days you come to a province of no great size, extending indeed no more than three days' journey in any direction, and this is called VOKHAN. The people worship Mahommet, and they have a peculiar language. They are gallant soldiers, and they have a chief whom they call NONE, which is as much as to say Count, and they are liegemen to the Prince of Badashan.

There are numbers of wild beasts of all sorts in this region. And when you leave this little country and ride three days northeast, always among mountains, you get to such a height that 'tis said to be the highest place in the world! And when you have got to this height you find [a great lake between two mountains, and out of it] a fine river running through a plain clothed with

the finest pasture in the world; in-somuch that a lean beast there will fatten to your heart's content in ten days. There are great numbers of all kinds of wild beasts; among others, wild sheep of great size, whose horns are good six palms in length. From these horns the shepherds make great bowls to eat from, and they use the horns also to enclose folds for their cattle at night. [Messer Marco was told also that the wolves were numerous and killed many of those wild sheep. Hence, quantities of their horns and bones were found, and these were made into great heaps by the wayside, in order to guide travelers when snow was on the ground.]

The plain is called PAMIER, and you ride across it for twelve days together, finding nothing but a desert without habitations or any green thing, so that travelers are obliged to carry with them whatever they have need of. The region is so lofty and cold that you do not even see any birds flying. And I must notice also that because of this great cold, fire does not burn so brightly nor give out so much heat as usual, nor does it cook food so effectually.

Asbestos the Salamander

CHINGINTALAS is also a province at the verge of the desert and lying northwest and north. It has an extent of sixteen days' journey and belongs to the Great Kaan and contains numerous towns and villages. There are three different races of people in it—Idolaters, Saracens and some Nestorian Christians. At the northern extremity of this province there is a mountain, in which are excellent veins of steel and ondanique. And you must know that in the same mountain there is a vein of the substance from which Salamander is made. For the real truth is that the Salamander is no beast, as they allege in our part of the world, but is a substance found in the earth; and I will tell you about it.

Everybody must be aware that it can be no animal's nature to live in fire, seeing that every animal is composed of all the four elements. Now I, Marco Polo, had a Turkish acquaintance of the name of Zurficar, and he was a very clever fellow. And this Turk related to Messer Marco Polo how he had lived three years in that region (*Turn the Page*)

on behalf of the Great Kaan, in order to procure those Salamanders for him. He said that the way they got them was by digging in that mountain till they found a certain vein. The substance of this vein was then taken and crushed, and when so treated it divides as it were into fibres of wool, which they set forth to dry. When dry, these fibres were pounded in a great copper mortar, and then washed, so as to remove all the earth and to leave only the fibres like fibres of wool. These were then spun and made into napkins. When first made these napkins are not very white, but by putting them into the fire for a while they come out as white as snow. And so again whenever they became dirty are bleached by being put in the fire.

Now this, and nought else, is the truth about the Salamander, and the people of the country all say the same. Any other account of the matter is fabulous nonsense.

North Star Out of Sight

When you leave the Island of Pentam and sail about one hundred miles, you reach the Island of JAVA THE LESS. For all its name, 'tis none so small but that it has a compass of two thousand miles or more. Now I will tell you about this island.

You see, there are upon it eight kingdoms and eight crowned kings. The people are all Idolaters, and every kingdom has a language of its own. The island hath great abundance of treasure, with costly spices, lign-aloes and spikenard and many others that never come into our parts.

Now I am going to tell you all about these eight kingdoms, or at least the greater part of them. But let me premise one marvelous thing, and that is the fact that this island lies so far to the south that the North Star, little or much, is never to be seen!

Now let us resume our subject, and first I will tell you of the kingdom of FERLEC.

This kingdom, you must know, is so much frequented by the Saracen merchants that they have converted the natives to the Law of Mahomet—I mean the towns-people only, for the hill-people live for all the world like beasts and eat human flesh, as well as all other kinds of flesh, clean or unclean. And they worship this, that and the other thing; for, in fact, the first thing that they see on rising in the morn-

ing, that they do worship for the rest of the day.

Having told you of the kingdom of Ferlec, I will now tell of another, which is called BASMA.

Rhinoceros the Unicorn

When you quit the kingdom of Ferlec you enter upon that of Basma. This also is an independent kingdom, and the people have a language of their own; but they are just like beasts, without laws or religion. They call themselves subjects of the Great Kaan, but they pay him no tribute; indeed, they are so far away that his men could not go thither. Still all these islanders declare themselves to be his subjects, and sometimes they send him curiosities as presents. There are wild elephants in the country and numerous unicorns, which are very nearly as big. They have hair like that of a buffalo, feet like those of an elephant and a horn in the middle of the forehead, which is black and very thick. They do no mischief, however, with the horn, but with the tongue alone; for this is covered all over with long and strong prickles [and when savage with anyone they crush him under their knees and then rasp him with their tongue]. The head resembles that of a wild boar, and they carry it ever bent towards the ground. They delight much to abide in mire and mud. 'Tis a passing ugly beast to look upon, and is not in the least like that which our stories tell of as being caught in the lap of a virgin; in fact, 'tis altogether different from what we fancied.

The Land of Darkness

Still farther north and a long way beyond that kingdom of which I have spoken, there is a region which bears the name of DARKNESS, because neither sun nor moon nor stars appear, but it is always as dark as with us in the twilight. The people have no king of their own, nor are they subject to any foreigner, and live like beasts. [They are dull of understanding, like half-witted persons.]

The Tartars, however, sometimes visit the country, and they do it in this way: They enter the region riding mares that have foals, and these foals they leave behind. After taking all the plunder that they can get, they find their way back by help of the mares, which are all eager to get back to their foals, and find the way much better than their riders could do.

Those people have vast quantities

of valuable peltry; thus they have those costly Sables, of which I spoke, and they have the Ermine, the Arculin, the Vair, the Black Fox and many other valuable furs. They are all hunters by trade, and amass amazing quantities of those furs. And the people who are on their borders, where the light is, purchase all those furs from them; for the people of the Land of Darkness carry the furs to the Light country for sale, and the merchants who purchase these make great gain thereby, I assure you.

The people of this region are tall and shapely, but very pale and colorless. One end of the country borders upon Great Rosia. And as there is no more to be said about it, I will now proceed and first I will tell you about the Province of Rosia.

Marco Polo was born in Venice in the year 1254, and died in the same city in the year 1324. He was the son of Nicolo Polo, who, with his brother Maffeo, set out from Constantinople in 1260 on a more adventurous trading journey than any they had before undertaken, and eventually reached the court of Kublai Kaan in Cathay (China). Upon their return that monarch requested that they have the Pope send him one hundred scholars to aid in educating his subjects. The Polo brothers reached Acre in 1269, but found that the Pope had died and the cardinals could not agree on a new one. Going then to their home in Venice, Nicolo found that his wife had died, and decided to take his son Marco, aged 15, back to Cathay with him. After waiting two years until the new Pope was elected, they started back for the East with two scholars, who promptly lost heart when they realized the dangers of the journey, and turned back. The three Polos reached Kublai Kaan's summer palace near the Khingan Mountains in 1275. Kublai Kaan was delighted with the young Marco and kept him in his employ for nearly twenty years. Finally, after the Polos had been refused the privilege of returning home more than once, their opportunity came when a young princess, who was being sent as a bride to the Kaan of Persia, needed an escort who could navigate the journey by sea. Thus Marco returned to Venice in 1295 and settled there. From the tall stories he told of his adventures, his townsmen nicknamed him "Millione." In 1298 he took part in a sea fight between the Venetians and the Genoese, in which he was taken prisoner. In the Genoa prison he met Rusticien of Pisa, who was a professional writer of tales of chivalry. He had been in the prison since a fight between his city and Genoa several years before. Rusticien seized the opportunity to write down the stories Marco Polo could tell of his adventures. Marco was released the next year and married soon after. He continued to live in Venice for the rest of his life. On his death-bed his friends begged him, for the sake of his soul, to tell them which parts of his book were true. He replied that he had not told half of his wonderful adventures.

Alphabet Traced—Continued

which attacked the camp where the officer lived, and where the raiders expected to find a rich booty. Ram, who was evidently interested in the gang, organized a celebration in which his people or clan, took part. The inscription may have been written by order of Ram himself."

The great inspiration of the inscription carvers, however, was Hathor, the Lady of Turquoise. All of the tablets found in the pile of rocks at the entrance to the mine deal with Hathor, or as she was sometimes called, Baalat, the Lady.

A typical inscription near her shrine has been translated by Prof. Butin:

"O, Baalat, kindly answer (me in) my sleep in the shelters in which people spend the night."

This plea for an answer from the goddess means that the person who set up the tablet went to the temple to sleep, hoping that in the sacred place he would get a dream message.

This idea, that religious dreams come in holy places, was a prevailing one during the time, the archaeologist states. Among the ruins to the temple of Hathor near the turquoise mines, are a number of small box-like rooms, and these are believed to be sleepers' quarters reserved for the ceremony of dreaming religious dreams.

Jacob, perhaps a contemporary of the Sinai miners, had a religious dream vision of angels when he slept in the open, and he set up a stone pillar afterward to mark the site as holy. In Greece, somewhat later, the sick went to dream in the shrine of the god of healing, Asklepios, hoping to learn what treatments they ought to take.

The miners of Sinai dreamed at the temple chiefly in the hope of getting aid in the mining quest and to ask protection from robbers. And judging from the number of compartments and rock shelters in front of the temple, dreaming was an important part of their religious ceremonies.

Among all the Sinai inscriptions, the one that has had most fame is one that now turns out to be commonplace. Four years ago, a German scholar, Prof. H. Grimme, studied a photograph of this inscription and declared that it was written by Moses, the leader of the Israelites. Moses, Prof. Grimme announced, was identified in the inscription as the superintendent of the miners and caretaker of the temple of Hathor,

which was also the temple of the Jewish Jehovah. According to the professor's translation, Moses set up the tablet to give thanks to Pharaoh's daughter Hatshepsut for rescuing him as a child from the Nile River and for the positions of power she had bestowed upon him.

Most scientists were frankly incredulous at this interpretation. Now, after seeing the original tablet, which has been brought to the Cairo Museum, Prof. Butin reports that many of the marks that Prof. Grimme took for alphabet signs in the photograph of the tablet are really scratches and cracks from the long exposure of the red sandstone to the weather. Prof. Grimme has been in Cairo recently and is preparing a new translation.

Prof. Butin's translation from the same badly worn tablet is that it is a petition addressed to the goddess Hathor by one of her devotees. Part that can be read in spite of the worn surface says: "This libation altar Mash, head of the stele setters, erected. Arise, now, O Baalat—"

The great interest of this inscription, he says, is the fact that the name of the head stone worker is given here, and it might be Moses. There are no vowels in the Phoenician writing, just as there were none in the Egyptian. The name is simply carved M-SH, which might be Mash or Mosheh. But, in any event, the mine official of the Sinai wilderness lived long before the struggle of the Children of Israel in Egypt, and he had nothing in common, except his name, with the great law-giver of Israel.

One small clue indicates that Sinai's mines have more to reveal about the alphabet. It is a puzzling coincidence, says Prof. Butin, that so many memorial tablets should be found tossed among the stone heaps before a mine entrance. Apparently, this was a workshop where the "writers" carved out their inscriptions. But why were those particular inscriptions never set up in their proper places beside the altar or structure for which they were designed? Were they defective, or was there some earthquake, plague, attack by robbers, or some other disaster that prevented the tablets being formally set up? And, most important of all, surely there were not merely fourteen tablets to Hathor in this camp of her devoted followers. Are there many others buried under the rock-strewn soil that could be uncovered by the spade of the archaeologist? (Turn the page)

Rescues Indian Language

Anthropology

Rescuing a dying language is a task which Dr. F. G. Speck, professor of anthropology of the University of Pennsylvania, has set himself. Dr. Speck recently returned from a hurried expedition to the Catawba Indian reservation in South Carolina, where he collected legends, medicine practices, and formulas, many of them in the Catawba tongue.

Languages of some Indian tribes are spoken by thousands of living Indians, but the remarkable Catawba language has faded from use until it is now spoken by only two Indian women, Mrs. Samson Owl and Sally Brown. Dr. Speck was appointed by the Committee of Research in American Indian Languages to make records of what these old people remember about their language and their unique customs.

This southern tribe is descended from the famous Ohio mound builders, Dr. Speck explains. In early times the Catawbas inhabited the Appalachian Mountains from Virginia southward. They were numerous and powerful and they spread over a large area. Their language and their blood were passed on to the great Sioux and plains nations.

"The Catawbas spoke a language made up of monosyllables," Dr. Speck says. "It was a much simpler language than the Indian languages in other parts of the south."

"The passing of a great and prominent human language from the earth must have happened many times in the history of races having no written language. But science will not stand by now and see this unhappy drama enacted without making some effort to save some record of a dying tongue."

The mighty Catawbas have dwindled fast since the white man's coming. A little over a century ago they were credited with 1,700 warriors, which would mean a population of about five times that number. At present the tribe has 30 warriors, and altogether 170 people.

Science News-Letter, April 21, 1928

Ground squirrels are nicknamed flickertails because of their habit of flicking their short tails up and down when uttering their call notes.

A German automobile club has offered court judges in Hamburg free driving lessons so that they may better understand automobile traffic problems.



WHAT PRICE KNOWLEDGE?

In ages of the past those who sought it—found it

But it was often expensive and limited to a few

What is it, then, that distinguishes this age of amazing scientific progress from the slowly moving ages of the past?

Is it not because new information, valuable to science, is no longer confined to its source?

Is it not because new discoveries are known almost immediately after their accomplishment?

THE WISTAR INSTITUTE BIBLIOGRAPHIC SERVICE

brings to your desk today, in AUTHORS' ABSTRACT form, the results of yesterday's experiments and researches in anatomy and zoology before the papers actually appear in printed form!

These advance abstract sheets contain prices for reprints of the complete papers listed therein. This makes it possible, for those who desire, to purchase copies of papers of most interest, at slight cost, without the necessity of subscribing to any or all of the journals which are included in

THE WISTAR INSTITUTE BIBLIOGRAPHIC SERVICE

ADVANCE ABSTRACT SHEETS - - \$3.00 per year

Issued every few days

BIBLIOGRAPHIC SERVICE CARDS - - \$5.00 per year

With complete bibliographic references

THE WISTAR INSTITUTE OF ANATOMY AND BIOLOGY

Thirty-sixth Street and Woodland Ave. - - - Philadelphia, Pa.

Alphabet—Continued

These questions, raised by the translator, may be answered, for the Harvard-Michigan expedition has announced its intention of setting out again in 1929 to probe still further the mysteries of the alphabet in the Sinai wilderness.

Science News-Letter, April 21, 1928

Ferns like shade, but grow best in an airy, slightly sunny place rather than in a dark sunless corner of a room.

A new island has appeared near the island of Krakatao since the recent eruption of Krakatao's famous volcano.

A health campaign in a northwestern city has resulted in ten times as much spinach being eaten as in previous years.

A loblolly pine tree in Louisiana grew so fast for ten years that its diameter increased an average of an inch and a half each year.

China is having trouble with private mints, which illegally turn out coins containing much less silver than the government standard.

The corn belt of the United States produces more food for livestock and more meat for human use than any other area of its size in the world.

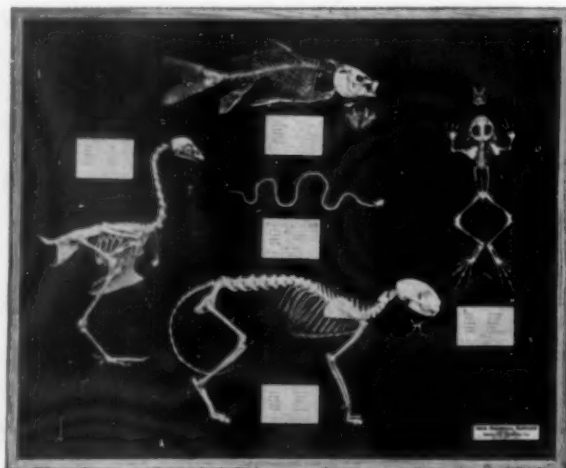
Staff of Science Service—Director, Edwin E. Slosson; Managing Editor, Watson Davis; Staff Writers, Frank Thone, James Stokley, Emily C. Davis, Marjorie MacDill; Sales and Advertising Manager, Hallie Jenkins.

Board of Trustees of Science Service—Representing the American Association for the Advancement of Science, J. McKeen Cattell, Treasurer, Editor, Science, Garrison, N. Y.; D. T. MacDougal, Director, Desert Laboratory, Tucson, Ariz.; M. I. Pupin, Professor of Electromechanics, Columbia University, New York City. Representing the National Academy of Sciences, John C. Merriam, President, Carnegie Institution of Washington; R. A. Millikan, Director, Norman Bridge Laboratory of Physics, California Institute of Technology, Pasadena, Calif.; Dr. David White, Chairman of the Division of Geology and Geography, National Research Council. Representing National Research Council, Vernon Kellogg, Vice-President and Chairman of Executive Committee, Permanent Secretary, National Research Council, Washington, D. C.; C. G. Abbot, Secretary, Smithsonian Institution, Washington, D. C.; Victor C. Vaughan, Professor Emeritus of Hygiene, University of Michigan. Representing Journalistic Profession, John H. Finley, Associate Editor, New York Times; Mark Sullivan, Writer, Washington, D. C.; Marlen E. Pew, Editor of Editor and Publisher, New York City. Representing E. W. Scripps Estate, W. E. Ritter, President, University of California; Robert P. Scripps, Scripps-Howard Newspapers, West Chester, Ohio; Thomas L. Sidlo, Cleveland, Ohio.

High Grade Prepared Skeletons

At Favorable Prices

Satisfaction Guaranteed



Of the extensive line that we prepare and carry in stock, the following select items are favorites with High School and College instructors:

Z015	Squalus, cartilaginous, in museum jar	\$25.00
Z050	Necturus on base	11.00
Z061	Bull Frog in glass	12.00
Z066	Grass Frog in glass	6.50
Z0105	Turtle, 8" to 10"	12.50
Z0116	Alligator on base	25.00
Z0120	Chicken on base	16.00
Z0155	Cat on base	18.00
Z0195	Monkey on base	25.00

We have frequent calls from High Schools for a set of vertebrate skeletons mounted in a hardwood glass-covered wall case, size 24x32". This set includes the Perch, Pigeon, Turtle, Rat and Grass Frog, price \$53.00.

The larger set with specimens as illustrated above costs \$75.00.

Our skeletons are excellent for class use as well as for building up the permanent school museum.

Write for complete list and for biology catalog No. 5B.

DENOYER-GEPPERT COMPANY

Makers and Importers of Anatomical Models, Charts, Skeletons, Specimens and Slides

5235-57 Ravenswood Avenue

Chicago, Ill.

Whales and Jack Rabbits

Mammalogy

Herewith are reported some of the outstanding papers read at the recent meeting of the American Society of Mammalogists at Washington.

Whaling did not go out with the clipper ships at the advent of steam and kerosene.

The modern whale brings in money comparable with the proceeds of the golden age of whaling when corset-makers paid \$5 a pound for whale-bone, it was revealed at the recent whale symposium at the U. S. National Museum in connection with the meeting of the American Society of Mammalogists.

At the South Shetland Islands, close to the Antarctic Circle, Dr. Waldo L. Schmitt of the National Museum told the assembled scientists, floating factories convert the big cetaceans brought in by the steam whalers into oil for the soap companies, bone charcoal for the sugar refining industry, and ground dried meat for chicken feed. Under this efficient management a single whale will bring as high as \$10,000, Dr. Schmitt declared. The harpooner, the man on whose skill in hurling barbed death at the huge sea mammals the success of the expedition depends, is the most highly paid member of this modern industry carried on in the shadow of the South Pole.

At Eureka, Calif., is a shore station, described by Dr. A. Brazier Howell, also of the National Museum staff, where a similar whale factory operates on land, turning the products of the humpbacked whales of the west coast into the same useful commodities as are shipped from the Antarctic. The highest value for a California whale, however, only reaches around \$2,500.

A whale louse, one third of an inch long, which is not really a louse at all but a member of the crab family that behaves like a cootie, is one of the pests that make life interesting for the great sea beasts, according to Dr. H. C. Raven of the American Museum of Natural History.

The white whales have formed the basis of an industry that has descended from father to son in the province of Quebec, Canada, since colonial times, Copley Amory told the biologists and naturalists. The hides of the big fellows are exported to Scotland where the canny Scots turn them all into shoestrings, and apparently make money at it.

Remington Kellogg, of the U. S. Biological Survey, issued a plea to members of the society to turn in information about any logs of old whal-

ing vessels that they might chance to run across. From such records as this, scientists are digging out valuable data about the migrations of whales. Sometimes, Mr. Kellogg pointed out, a parasite of known southern origin found on the body of a whale in northern waters will reveal useful information about the animal's wanderings.

The bottle-nosed porpoise fishery at Hatteras, N. C. was described by Howard I. Wordell. This porpoise is sought for the oil case in the top of its head that furnishes the most expensive oil known to commerce. It is highly prized by watchmakers because it is practically the only oil that does not dry out. About two quarts are obtained from each animal.

With whales being killed at the rate of 18,000 per year, some system of licensing through an international agreement should be established to prevent the great cetaceans from becoming extinct and to safeguard the future of the industry, said Lewis Radcliffe of the U. S. Bureau of Fisheries. Though the whaling industry today is largely in the hands of the Norwegians, an increasing flood of the articles made from whale oil, of which over 60,000,000 gallons were produced last year, is finding its way into the American markets, Mr. Radcliffe declared. Soap factories are the largest consumers of whale oil but glycerin derived from whale oil is used as the basis of many kinds of beauty creams, shaving soaps, tooth paste and other toilet preparations. In Europe some of the oil is made into lard substitutes and candles. Sperm oil is a valuable lubricant while spermaceti is used in cold cream. Whale meal, bone meal, blood meal, stearine and canned whale meat are other by-products of this old-new industry that have swelled its income to around \$30,000,000 annually.

Whaling ceased to be predominantly American, said Mr. Radcliffe, at the time of the Civil War when the New England whalers were burned, captured or turned into warships. The discovery of petroleum as an illuminating agent gave it another setback in this country. The invention of the harpoon gun in 1864, however, marked a new era in whaling. This and the use of steam whalers and motor launches that permit the towing of the captured animal ashore to stations where the carcass can be more completely utilized have

revolutionized the industry. An even more efficient phase was the development of the floating factory whereby the whole outfit of small whalers and manufacturing plant could transfer itself to new fields as fast as one was exhausted.

Since the beginning of the twentieth century whaling operations have been confined largely to the Antarctic where they still remain largely in the control of Norwegian companies.

Jack-rabbits may be dumb, but they know how to hide their young so well that very few are ever found by naturalists, Dr. Chas. T. Vorhies, of the University of Arizona, and Dr. Walter P. Taylor of the U. S. Biological Survey find.

The various jack-rabbits are range pests of outstanding destructiveness. In fenced plots on the open range near Tucson, Arizona, jack-rabbits and other rodents consumed 81 per cent of the range forage. One season 88 acres of cotton were destroyed in one locality, entailing a loss to the farmers of \$14,960. The breeding season of the jack-rabbits of the southwest embraces nine months of the year, January to September, although the number of young in each litter is small, usually only from 1 to 3, with a maximum of 5.

The food of the rabbits includes several species of important forage grasses, as well as the bark of mesquites, catclaws, and palo verdes. Rabbits drink water when available, but over most of the year they rely on cactus and buried tuberous roots for liquid refreshment. The life-history and experimental studies of these animals are to be continued with the object of obtaining a better understanding of the relations of rabbits to important forage plants on the grazing ranges and of possible means of increasing range productivity through their control.

Science News-Letter, April 21, 1938

Filling a dirigible with helium gas costs more than a quarter of a million dollars.

The African Gold Coast has a population of over 2,000,000 natives and 2,000 non-natives.

The span of life of industrial workers is found to be eight years shorter than of non-industrial workers.

WE ARE READY TO SERVE YOU!

Place Your Order Now

We can guarantee delivery

Prudent Buyers regularly place orders before the vacation, indicating date delivery is desired.

Better Prices are obtained on orders placed before the peak of the Fall Season demands.

Check Your Laboratory, and have your list of needs started through any necessary routine.

Catalogs will be sent on request. Special lists for commonly used texts and manuals can also be supplied. Kindly give your official position.

A Sign of Quality **WELCH** A Mark of Service

W. M. Welch Scientific Company

1516 Chicago Street
Manufacturers, Importers and Exporters of
Scientific Apparatus and School Supplies
Chicago, Ill., U. S. A.

A DEBATE on the Theory of RELATIVITY

With an Introduction by
William Lowe Bryan

President of Indiana University

RELATIVITY has finally been explained in non-technical terms. Anyone wishing to know the principles of this theory will find them clearly stated in debate form in this volume.

Favoring the Theory:

ROBERT D. CARMICHAEL,
University of Illinois

HAROLD T. DAVIS,
Indiana University

Opposing the Theory:

WILLIAM D. MACMILLAN,
University of Chicago

MASON E. HUFFORD,
Indiana University

Cloth, \$2.00

If you are interested in philosophy, science, or religion, let us send you a complete catalog of our books.

**The Open Court Publishing
Company**

337 E. Chicago Ave.

Chicago

The A B C of Vitamins

Physiological Chemistry

C. H. A., in the *Bulletin of the Virginia Section of the American Chemical Society*:

A

Oh, fine and fat was Ralph the rat,
And his eye was a clear cold grey.
How mournful that he ate less fat
As day succeeded day,
Till he found each cornea daily
hornier,
Lacking its vitamin A.
"I missed my vitamin A, my dears,"
That rat was heard to say,
"And you'll find your eyes will
keratinize
If you miss your Vitamin A."

B

Now polished rice is extremely nice
At a high suburban tea,
But Arbuthnot Lane remarks with
pain
That it lacks all vitamin B,
And beri-beri is very very
Hard on the nerves, says he.
"Oh take your vitamin B, my dears,"
I heard that surgeon say;
"If I hadn't been fed on standard
bread
I shouldn't be here today."

C

The scurvy flew through the schooner-
er's crew
As they sailed on the Arctic Sea.
They were far from land and their
food was canned,
So they got no vitamin C.
For "Devil's the use of orange juice"

The Skipper had said, said he.
They were victualled with pickled
pork, my dears,
Those mariners bold and free.
Yet life's but brief on the best corned
beef

If you don't get vitamin C.

D

The epiphyses of Jemima's knees
Were a truly appalling sight;
For the rickets strikes whom it jolly
well likes
If vitamin D's not right,
Though its plots we foil with our
cod liver oil
Or our ultra-violet light.
So swallow your cod liver oil, my
dears,
And bonny big babes you'll be.
Though it makes you sick, it's a cure
for the rickets
And teeming with vitamin D.

E

Now vitamins D and A, B and C
Will ensure that you're happy and
strong;
But that's no use; you must reproduce
Or the race won't last for long.
So vitamin E is the stuff for me,
And its praises end my song.
We'll double the birthrate yet, my
dears,
If we all eat vitamin E.
We can blast the hopes of Maria
Stopes
By taking it with our tea.

Science News-Letter, April 21, 1933

The True Humanizer

Physics

ROBERT A. MILLIKAN, in the *Atlantic Monthly*:

Not long ago I heard a certain British literary man of magnificent craftsmanship and fine influence in his own field declare that he saw no values in our modern "mechanical age." Further, this same man recently visited a plant where the very foundations of our modern civilization are being laid. A ton of earth lies underneath a mountain. Scattered through that ton in infinitesimal grains is just two dollars' worth of copper. That ton of earth is being dug out of its resting place, transported to the mill miles away, the infinitesimal particles of copper miraculously picked out by invisible chemical forces, then deposited in great sheets by the equally invisible forces of the electric current, then shipped three thousand miles and again refined, then drawn into wires to transport the formerly wasted energy of a waterfall—and all these op-

erations from the buried ton of Arizona dirt to refined copper in New York done at a cost of less than two dollars, for there was no more value there.

This amazing achievement not only did not interest this humanist, but he complained about disfiguring the desert by electrical transmission lines. Unbelievable blindness—a soul without a spark of imagination, else it would have seen the hundred thousand powerful, prancing horses which are speeding along each of those wires, transforming the desert into a garden, making it possible for him and his kind to live and work without standing on the bowed backs of human slaves as his prototype has always done in ages past. Seen in this rôle, that humanist was neither humanist nor philosopher, for he was not really interested in humanity. In this picture it is the scientist who is the real humanist. *Science News-Letter, April 21, 1933*

5,000,000 Volts Now Achieved

Physics

The highest electrical potential ever produced by man, over 5,000,000 volts, has been achieved in the laboratory of Dr. Gregory Breit and Dr. M. A. Tuve, at the Department of Terrestrial Magnetism of the Carnegie Institution of Washington.

Using the same apparatus, the physicists have succeeded in applying a voltage of a million volts to a vacuum tube equipped with electrodes outside the evacuated glass bulb. This is the highest voltage ever impressed upon a vacuum tube.

Disintegration of the elements into their building blocks of positive and negative electricity, probing of the constitution of the nucleus or mysterious heart of the atom and other such fundamental achievements in studying the constitution of matter are promised through the development of these powerful scientific tools.

A source of high-speed projectiles, both electrons and atoms, more powerful than the radiation from radium, whose irresistible and natural disintegration now gives the most powerful minute bullets known to science, will be provided through the utilization of the high voltages now developed.

The apparatus, operating on 60-cycle current, sparking 120 times a second, will give out a stream of electrons that it would require two pounds of radium to produce. Over a kilowatt of power at the voltage of 5,000,000 can be emitted.

Although the very high voltages were first obtained nearly a year ago, the results of Carnegie Institution experiments become known to the scientific world only through the publication of a technical communication to the British scientific magazine, *Nature*. Associated with Dr. Breit and Dr. Tuve in the work is Lieut. Odd Dahl, the Norwegian army aviator who was aboard Amundsen's ship *Maud* during its long Arctic cruise. He is the first man to have flown north of the Arctic circle.

Relatively little space is necessary in order to house the apparatus necessary to produce the 5,000,000 volts. An X-ray machine such as used in medical practice provides current at about 50,000 volts which is fed into and charges a large condenser constructed from window glass and lead foil. This condenser discharges suddenly and spectacularly through a spark gap into a small inductance coil,

which is coupled with Tesla coil a yard long, three inches in diameter and wound with 7,000 turns of fine wire. This is the coil in which the 5,000,000 volts is produced. To insulate the wire on the Tesla coil it is immersed in a large tank of transformer oil under pressure of 500 pounds per square inch. Preliminary experiments showed that the oil in an open tank under ordinary atmospheric pressure would insulate the coil sufficiently well for 3,000,000 volts.

It is believed that even higher voltages can be obtained by using larger Tesla coils, but for the past year Dr. Breit has been occupied with the problem of applying to vacuum tubes the high voltages already obtained.

"Five million volts when applied to doubly charged helium atoms, or particularly to alpha particles, or still better to multiply charged ions or stripped atoms should be capable of giving particles with energy much in excess of the swiftest alpha particles so far observed," the physicists declared in their scientific report.

In order to use the high voltages it is necessary to get them inside an air-free tube in which the metal to be disintegrated or the substance to be otherwise affected can be placed. Ordinary vacuum tubes with electrodes inside will not stand voltages of more than about 300,000. The development of the outside electrode tube into which through the glass a million volts can be placed is an important step toward applying the high voltages in disintegration experiments.

The significance of these new achievements can be appreciated when it is realized that one of the ends toward which scientists have been striving is a successful attack on the nucleus of the atom. The atom is composed of a center surrounded by whirling electrons. It is like a minute solar system in which the nucleus is the sun and the electrons are planets. Sweeping off the electrons is easy, but the penetration and disintegration of the small, relatively heavy nucleus is more difficult. Sir Ernest Rutherford, the British physicist, by bombardment with alpha particles from radium has knocked hydrogen out of light-weight elements, such as sodium, potassium, etc., and thus proved transmutation of elements (Turn to next page)

NATURE RAMBLINGS

BY FRANK THONE

Natural History



Trillium

When the blessed St. Patrick was arguing theology with the pagan king (who was an Ulsterman, and therefore not to be either convinced or quelled without a stiff dispute) he snatched up a shamrock leaf as the readiest means of illustrating his point. Had a trillium been equally handy, it might have been the national flower of Ireland today. For the trillium is the most orthodox exemplar of the Nicene Creed to be found in the whole floral kingdom: three leaves, no more, around its stem; and in its flower three sepals, three petals, stamens in two rings of three each, a three-parted pistil, and at the last its seeds in a three-parted capsule.

But alas for Ireland: though it has the shamrock, it has no trilliums. The genus *Trillium* is not a large one; only 15 species, according to Engler and Gilg, and these confined to Asia and America. With us, however, the trilliums are well developed, and in the eastern part of our country at least hardly any well-wooded ravine is without them, although reckless picking has practically wiped them out in some too-much-visited spots.

Red, usually a very deep red, and white, tending to become suffused with pink as the petals mature, are the colors favored by trilliums. They are all early blossomers, but perhaps one of the smaller red ones, almost a maroon color, is the most frequent winner of the race with the retreating frost. This species has won for itself the soubriquet of "wake-robin"; though that name is sometimes extended to include all the trilliums.

Science Is Good Reading

Here is a book, ready April 30th, which is as entertaining as it is informative.—

SIR ISAAC NEWTON

1727-1927

A Bi-Centenary Evaluation of His Work

Edited by FREDERICK E. BRASCH

A volume which tells the story of the great physicist's influence and after fame on his two hundredth anniversary.

An estimate of England's greatest scientist by leading scientists of the New World. Containing:

Newton in the Light of Modern Criticism—David Eugene Smith.

Newton and Optics—Dayton C. Miller.

Newton's Philosophy of Gravitation with Special Reference to Modern Relativity Ideas—George D. Birkhoff.

Newton's Influence upon the Development of Astrophysics—William W. Campbell.

Newton's Dynamics—Michael I. Pupin.

Newton as an Experimental Philosopher—Paul W. Heyl.

Developments Following from Newton's Work—Ernest W. Brown.

Newton's Twenty Years' Delay in Announcing the Law of Gravitation—Florian Cajori.

Newton's Fluxions—Florian Cajori.

Newton's Work in Alchemy and Chemistry—Lyman C. Newell.

Newton's Place in the History of Religious Thought—George S. Brett.

Newton in the Mint—George E. Roberts.

Newton's First Critical Disciple in the American Colonies—F. E. Brasch.

A unique and important volume. Of interest alike to the scientific and general reader.

\$5.00

THE WILLIAMS & WILKINS COMPANY,
Mt. Royal and Guilford Avenues,
Baltimore, Maryland.

Please send me one copy of *Sir Isaac Newton, 1727-1927*, for which I enclose \$5.00.

Name

Address

SO. N. L.—48

5,000,000 Volts—Continued

possible. What is now needed is heavier artillery and that is the object of the Carnegie Institution work. Electrons such as are given off from any electric light filament are immensely speeded up by high voltage current, but they are light in weight. More "beef" is needed, so alpha particles, which are speeding helium atoms, are projected against the nucleus being besieged. When given off from radium these alpha particles are already moving at the speed that would be imparted by some 3,800,000 volts. The Carnegie Institution physicists intend eventually to give them another shove with 5,000,000 or more volts and obtain a more powerful bombardment than radium can produce. Even speedier and weightier projectiles will be obtained by similarly boosting the speeding bare hearts of atoms from which the electrons have been stripped.

By increasing in size the present apparatus and by feeding the voltages from one tube into another, it may be possible to obtain in future years voltages of many times the 5,000,000 now achieved. When 30,000,000 volts are produced and applied, some of the moot questions in physics will probably be settled. Theoretically, it may be impossible to have radiation at this high voltage, since the electron would be damped and all wave lengths would become one. This is also the voltage involved in the creation of the helium atom out of four hydrogen atoms, which Dr. Robert Andrews Millikan believes gives rise to the powerful cosmic rays that bombard the earth from outer space.

The highest voltage produced heretofore was 3,600,000, obtained by the General Electric Company at Pittsfield, Mass., through the use of its so-called artificial lightning apparatus. The highest voltage heretofore obtained within a vacuum tube was 900,000 volts within the cascaded three-in-one cathode ray tubes of Dr. W. D. Coolidge of the General Electric Company.

Science News-Letter, April 21, 1928

The province of Quebec is the world's chief source of asbestos.

Soot falling in London amounts to 288 tons per square mile in a year.

Aerial photography has proved a great help in locating timber for pulp purposes in Canada.

FIRST GLANCES AT NEW BOOKS

SNAPSHOTS OF SCIENCE—Edwin E. Slosson—*Century* (\$2). The title of Dr. Slosson's newest book is apt. It is easy to think of the author as a photographer of scientific progress, roaming about with mental camera in hand. We can see him snapping word pictures wherever he finds something new and striking, always trying to get his subject into a clear light and always catching it when it is doing something interesting. The word pictures in the album number sixty-five, and the range of subject matter carries the reader around the world of scientific research, from rubber investigations to cancer theories, from the size of stars to the pathology of art, from dreams to cockroaches, from fireless furnaces to sailless sailboats, from the beginning of life to the end of the world.

For those who want to develop some of the snapshots into full length portraits of current scientific research, the author has appended a long list of references for further and more intensive reading.—*E. C. D.*

General Science

Science News-Letter, April 21, 1928

A MAN OF LEARNING—Nelson Antrim Crawford—*Little, Brown* (\$2.50). A deliciously written satire on a type of university president that is all too common in the United States. Many a college professor who reads its pages will recognize the head of his own institution!

Education

Science News-Letter, April 21, 1928

THE STONES OF ITALY—C. T. G. Formilli—*Macmillan* (\$7). The color and the sunniness of Italy are captured to an unusual extent in this pleasant book about the Italian scene, ancient and modern. For the reader who knows Italy, or who is planning to get acquainted with it this summer, here is a comprehensive reference book. And for the person who must know Italy only by print and picture, Mr. Formilli's volume is an attractive way of seeing the country. Comfortable type, thirty-two colored illustrations by the author, and a good index add to the work.

Geology—Travel

Science News-Letter, April 21, 1928

SKYWARD—Richard E. Byrd—*Putnam*. Commander Byrd here relates how he learned to fly, his experiences in flying over the Atlantic and to the North Pole, and what he hopes to do in the Antarctic.

Aviation

Science News-Letter, April 21, 1928

PSYCHOLOGICAL CARE OF INFANT AND CHILD—John B. Watson—*Norton* (\$2). Dr. Watson aims to provide for mothers a psychological guide book somewhat along the line of Dr. Holt's famous manual on physical care of babies. The result is a small book, simply and clearly written, containing a great deal of information on developing children into satisfactory and successful human beings. Probably few mothers will agree with quite everything that Dr. Watson has to say, but that should not keep even a mother of the conservative or sentimental left-wing from realizing that there is much in the behaviorist's psychology that she can use to advantage.

Psychology

Science News-Letter, April 21, 1928

PSYCHOLOGY AS SCIENCE—H. P. Weld—*Holt* (\$2.50). "Psychology is not a science, it is merely an inquiry!" has long been a favorite pronouncement, even among psychologists. In this book the author endeavors to show that though the statement might once have been true, psychology, particularly what he terms "Existential Psychology," conforms "to that of the critical conception of science."

Psychology

Science News-Letter, April 21, 1928

LAUGHTER AND HEALTH—James J. Walsh—*Appleton* (\$1.50). The author has written "a serious book on laughter," by which he means that you will find more to think about than to smile at, as you read. But the after-effect of the book upon the reader should be to increase his daily average of smiles, chuckles, and laughs, for Dr. Walsh makes out a case of showing how laughter promotes both physical and mental health, through its direct effect upon the heart, lungs, and other organs.

Psychology

Science News-Letter, April 21, 1928

A CORRECTION FOR ARTIFICIAL DEFORMATION OF SKULLS—H. L. Shapiro—*American Museum of Natural History*. A method for dealing with a difficult anthropometrical problem.

Anthropology

Science News-Letter, April 21, 1928

DRAWINGS BY JOHN WEBBER OF NATIVES OF THE NORTHWEST COAST OF AMERICA, 1778—David I. Bushnell—*Smithsonian Institution*. Reproductions of a group of very valuable and well executed early Indian studies.

Anthropology

Science News-Letter, April 21, 1928

WHAT YOU SHOULD KNOW ABOUT HEALTH AND DISEASE—Howard W. Haggard—*Harper* (\$5). The title of this book is fully descriptive of its contents. Practically all of the ordinary health questions of the layman are answered in its pages, and the position of Dr. Haggard as a member of the faculty of Yale University is proof of his authority. No attempt is made to give treatment for disorders requiring medical attention, but close attention to its pages should enable anyone better to avoid them.

Hygiene

Science News-Letter, April 21, 1928

SUNSHINE AND HEALTH—Ronald Campbell Macfie—*Holt* (\$1). In this latest volume in the "Home University Library" the author has given the world an elementary but complete account of the important effects of sunlight on the human body. Enough of the physics of light, and the astronomy of the sun, is included to clarify the discussion.

Hygiene

Science News-Letter, April 21, 1928

FEDERAL HEALTH ADMINISTRATION IN THE UNITED STATES—Robert D. Leigh—*Harper* (\$5). A study of what the government has done and is doing for the health of its citizens, with suggestions as to ways in which the now separate organizations performing this work might profitably be unified. It is the latest volume in Harper's Public Health Series, edited by Dr. Allan J. McLaughlin, of the U. S. Public Health Service.

Hygiene

Science News-Letter, April 21, 1928

THE YOUNG MAN AND MEDICINE—Lewellys F. Barker—*Macmillan* (\$2.50). One of a vocational series by acknowledged leaders in their respective fields to help young men in the choice of a profession.

Medicine

Science News-Letter, April 21, 1928

BIRDS AND BEASTS OF THE ROMAN ZOO—Th. Knottnerus-Meyer, translated by Bernard Miall—*Century* (\$4). Officials of zoological parks, who have unique opportunities to study the ways of beasts and birds and to acquire a vast store of fascinating anecdote, are, fortunately for the rest of us, becoming vocal. This book, by the German director of the Zoological Gardens at Rome, is a very worthy addition to the literature.

Zoology

Science News-Letter, April 21, 1928

Popular Science

General Science

Extract from Editorial in *NATURE* (English Weekly), March 10, 1928:

Popular science is a phrase which almost inevitably conjures visions of Pepper's ghost, unpleasant smells, a loud bang, and a disapproving mother. Not only in chemistry and physics, but also in psychology, sociology, and economics, the term suggests a superficial acquaintance with the more amusing manifestations of natural phenomena or with some arguable thesis concerning political affairs rather than any widespread understanding of the relation between cause and effect. Nevertheless, there is a general lay interest in the march of science, and very laudable attempts have been made, and continue to be made, to keep the populace informed of the trend of its progress, its rate, its direction, its practical effects, and something of the spirit permeating its body of serving men and women. Such a presentation demands painstaking and prolonged effort. The material must not be inaccurate, yet it must necessarily be indefinite, it must be attractive but not sensational, dignified but not high-brow. It must not be presented in its native language, but in that of everyday speech; it must indicate some practical advantage or it must positively refrain from suggesting any such mundane possibility, according as it is intended to be read before or after dinner.

We need not debate the desirability of recording the progress of scientific investigation and of discussing cognate matters in such a way as appeals to the "average" man. Obviously, if the task is not undertaken there can be little public appreciation of or sympathy with the objects to which the workers have devoted their labours, neither can there be full support in the provision of conditions necessary for the fruition of their efforts. * * * It does not necessarily follow, of course, that progress is any the more rapid on account of public interest, especially when the problem happens to be one which may admit of confusion by the articulate assistance of partially informed critics, but it is indisputable that encouragement and provision are much more likely to be the outcome of knowledge than of ignorance. Apart from such a consideration, most readers of the general press seek to know more of the world around them, whether physical, moral, ethnological, or industrial, provided that the effort accompanying the stim-

ulation of their interest is not too noticeable. If science is displayed for their benefit, it is not intended that they should be creative investigators; if poetry, that they should rush into verse. Besides, ignorance of natural laws, as of other laws, is no insurance against the regrettable consequences which may arise from their neglect.

The translation of scientific news—nowadays so enormous in its bulk—into suitable language, and its condensation to comparatively minute dimensions, is undertaken in a systematic manner in the United States of America by an organization known as Science Service, Inc., directed by Dr. E. E. Slosson, and functioning under the auspices of the National Academy of Sciences, the National Research Council, and the American Association for the Advancement of Science. This organization publishes daily science news bulletins, and a weekly summary of current science entitled the *SCIENCE NEWS-LETTER*, in which current events, scientific discoveries, and résumés of progress, together with broadly-drawn reports of the proceedings of scientific conventions, are recorded in simple terms. In addition, there is compiled a weekly digest, intended to present the cream of the week's scientific news, which is regularly used by more than twenty broadcasting stations in the United States. * * * We are familiar with the result of excursions by otherwise competent journalists into spheres with which they are not familiar; indeed, the distaste for publicity which is usually ascribed to undue modesty might, if the truth were known, quite possibly often be traced simply to a fear of misrepresentation. The American press is now able, however, to rely on telegraphic news "stories," prepared by the managing editor of Science Service, Mr. Watson Davis, and the members of his specialist staff, so that their reports of the proceedings of conferences and conventions shall be well-balanced and accurate, without losing their attractiveness as items of news.

In Great Britain there is, of course, fairly adequate publication and survey of the results of research, such publication being intended for the use of the scientific population itself, and being normally directed by members of that fraternity, but we seem to lack

a widespread sense of the importance of an appeal to the non-specialist members of the community as part of their ordinary daily culture, an appeal which must, to be worth while, be sponsored by the most notable members of the professions, and to be effective by the more journalistically-minded among them. There is, after all, no valid reason why the dissemination of knowledge beyond the confines of schools and colleges, provided it is carried out with scrupulous honesty, dignity, and restraint, should not be acknowledged to be as valuable a social service as the collection and arrangement of the knowledge itself

Dr. E. E. Slosson, in a recent address before the American Association for Adult Education, made the somewhat surprising statement that archaeology and astronomy—essentially remote and impractical—head the list of the sciences in order of popular interest, and that the essentially practical sciences are low in the list. He ascribes this, probably correctly, to the same cause as that operating in the selection of, say, "Futuristic Art" as a subject of study in a women's club rather than "Domestic Economy." He declares that scientific workers have been too humble and too modest in claiming credit for what they have done and what they can do in the control of human affairs, but have allowed statesmen, writers, and financiers to take all the praise for the advance in civilization and the amelioration of living conditions that were really due to scientific research. If we look at the matter from the point of view of the wealth of nations, as Dr. G. E. Hale, the honorary chairman of the National Research Council, has recently done in *Harper's Magazine*, it is clear enough that the business of men of science is to help to guide mankind as well as to serve it. That is to say, if a scientific orientation can more universally be associated with moral and religious convictions in the equipment of the human mind, there will be less danger of the wicked and unscrupulous misuse of scientific power, less point in arguing the prohibition of poison gas, and an extension of that wider fraternal patriotism which distinguishes scientific international relations.

Science News-Letter, April 21, 1928